Alg. 2 Warm Up # 7-1

1. Write in vertex form by completing the square:

$$y = 2x^2 - 12x + 5$$

2. Combine and simplify:

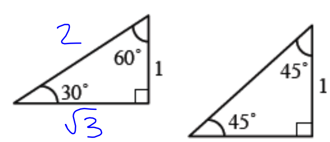
$$\frac{2}{x+4} - \frac{x-4}{x^2-4}$$

3. Solve: $2^x - 5 = 7$

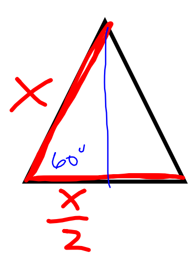
HW Questions:

7-15. Copy the triangles at right.

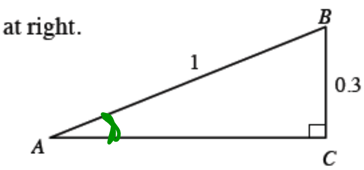
a. Label the missing sides with their *exact* lengths. That is, leave your answers in radical form.



b. The $30° - 60° - 90°$ triangle is sometimes called a half-equilateral. Draw a picture to illustrate this, and explain how that fact can be used to help label the missing sides in part (a).



7-16. Find the measure of angle A in the diagram at right.

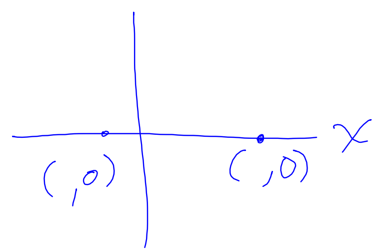


7-17. Find the x- and y-intercepts of the quadratic function $y = 2x^2 + x - 10$.

$0 = (2x+5)(x-2)$

$(2,0)$ $(-\frac{5}{2},0)$

$(0,-10)$



$\sin A = \frac{0.3}{1}$

$A = \sin^{-1}(0.3)$

$\approx$

7-18. Evaluate each expression without using a calculator or changing the form of the expression.

a. $\log(1)$

b. $\log(10^3)$

c. $10^{\log(4)}$

d. $10^{3\log(4)}$

$\log_{10} 10^3 = 3$

$10^{?} = 10^3$

7-18. Evaluate each expression without using a calculator or ~~changing the form of the expression~~.

a. $\log(1)$ Base 10 raised to what power gives you 1?

b. $\log(10^3)$

c. $10^{\log(4)}$

d. $10^{3\log(4)}$

A good tool if you are confused..
Set the expression = to y, then change forms to see if you can tell what y is.

c) $10^{\log 4} = y$

$\log_{10} y = \log_{10} 4$

$y = 4$

So $10^{\log 4} = 4$

d) $10^{3\log(4)} = y$

$\log_{10} y = 3\log_{10} 4$

put back up as an exponent

$\log_{10} y = \log_{10} 4^3$

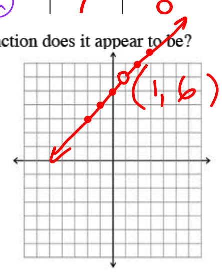
$y = 4^3$

So $10^{3\log 4} = 4^3$

7-19. Complete the table of values for $f(x) = \frac{x^2+4x-5}{x-1}$.

x	−2	−1	0	1	2	3
y	3	4	5	☹	7	8

a. Graph the points in the table. What kind of function does it appear to be? Why is it not correct to connect all of the dots?



f(0.9) = 5.9

f(1.1) = 6.1

b. Look for a simple pattern for the values in the table. What appears to be the relationship between x and y? Calculate $f(0.9)$ and $f(1.1)$ and add the points to your graph. Is there an asymptote at $x = 1$? If you are unsure, calculate $f(0.99)$ and $f(1.01)$ as well.

c. Simplify the formula for $f(x)$. What do you think the complete graph looks like?

$$y = \frac{(x+5)\cancel{(x-1)}}{\cancel{(x-1)}}$$

$y = x + 5$

$y = 1 + 5$

$y = 6$

7-20. In 1998, Terre Haute, Indiana had a population of 72,000 people. In 2000, the population had dropped to 70,379. City officials expect the population to level off eventually at 60,000.

a. What kind of function would best model the population over time?

exponential

b. Write an equation that would model the changing population over time.

horizontal asymptote at 60,000

$y = ab^x + 60{,}000$

Let $x = 0$ in 1998

$(0, 72{,}000)$

$72{,}000 = ab^0 + 60{,}000$

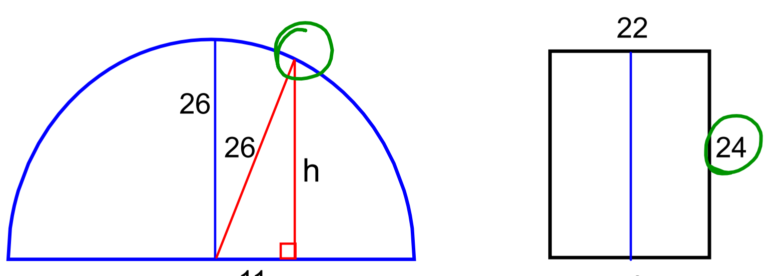
$-60{,}000 \qquad -60{,}000$

$12{,}000 = a$

$\rightarrow y = 12{,}000\,b^x + 60{,}000$

plug in $(2, 70{,}379)$ to find b.

7-21. A semi-circular tunnel is 26 feet high at its highest point. A road 48 feet wide is centered under the tunnel. Bruce needs to move a house on a trailer through the tunnel. The load is 22 feet wide and 24 feet high. Will he make it? Use a diagram to help justify your reasoning completely.



house & trailer

$11^2 + h^2 = 26^2$

$121 + h^2 = 676$

$h^2 = 555$

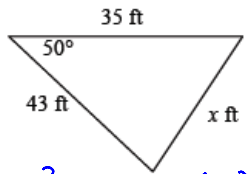
$h \approx 23.56$

height of the tunnel at the edge of the house is not tall enough!

7-22. Find the value of x. Glossary

Use law of cosines

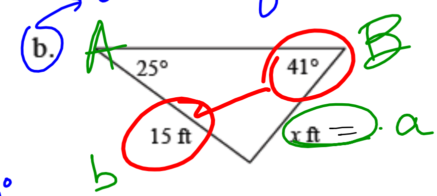
a.



$$x^2 = 43^2 + 35^2 - 2(43)(35)\cos 50^\circ$$

Use law of sines

b.



7-23. Solve the system of equations shown at right.

$x + y + z = 40$

$y = x - 5$

$x = 2z$

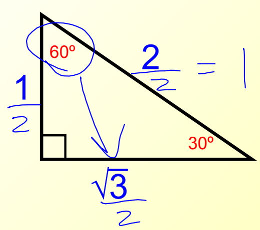
$y = 2z - 5$

$2z + 2z - 5 + z = 40$

Math Notes:

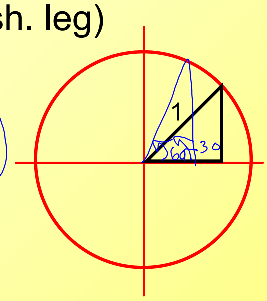
30° - 60° - 90° hyp = 2 (sh. leg)

long leg = √3 (sh. leg)

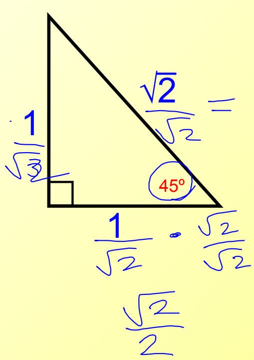


$\sin 30^\circ = \frac{1}{2}$

$\sin 60^\circ = \frac{\sqrt{3}}{2}$



45° - 45° - 90° hyp = √2(leg)



What happens when the hypotenuse = 1 ?

$\sin 45^\circ = \frac{\sqrt{2}}{2}$

≈ 0.71

METHODS AND MEANINGS

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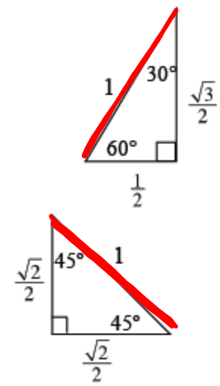
MATH NOTES

Special Right-Triangle Relationships

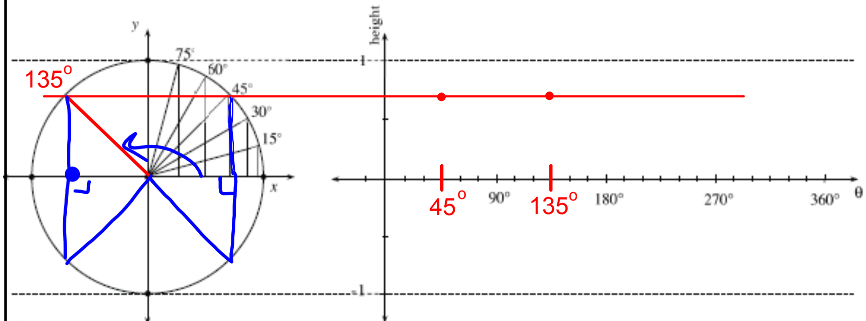
As you may recall from geometry, there are certain right triangles whose sides have special relationships that make certain calculations easier. One such triangle is half of an equilateral triangle and is known as a **30° – 60° – 90° triangle**, named after the degree measures of its angles.

The other special triangle is half of a square and is known as the **45° – 45° – 90° triangle**. Both triangles and the relationships between their side lengths are shown at right.



Green CP's

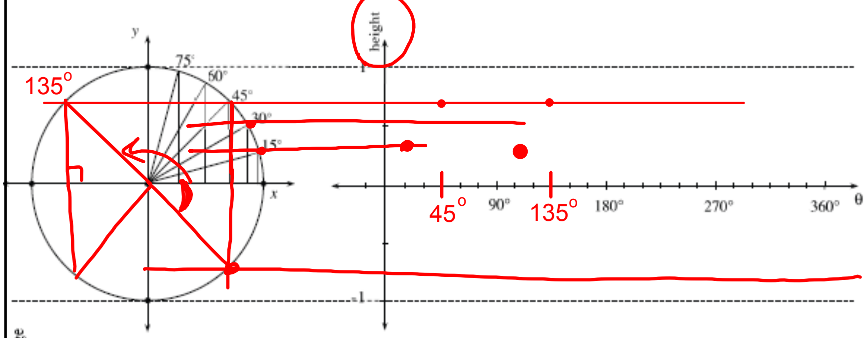
$y = \sin\theta$



Lesson 7.1.2D Resource Page

Green CP's

$h = \sin\theta$



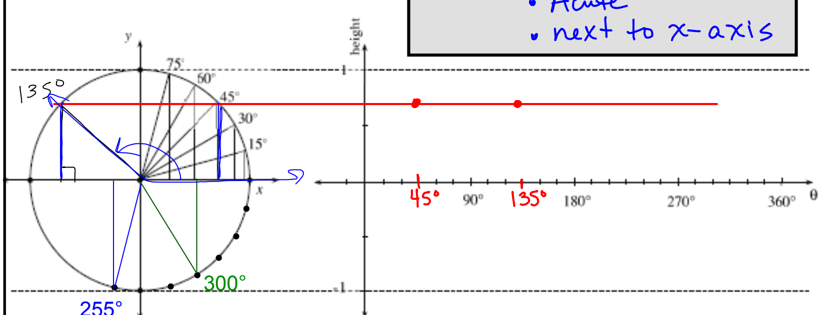
Lesson 7.1.2D Resource Page

$\sin 45° = \sin 135°$

$\frac{\sqrt{2}}{2}$

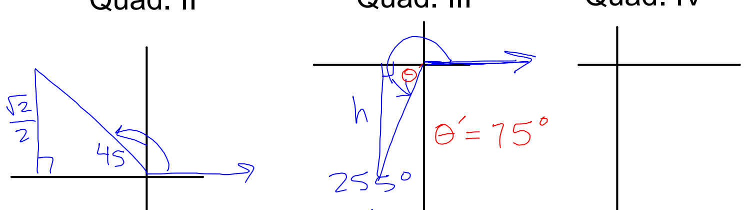
Green CP's: 7-#14

θ' Reference Angles
- Acute
- next to x-axis



Lesson 7.1.2D Resource Page

Quad. II Quad. III Quad. IV



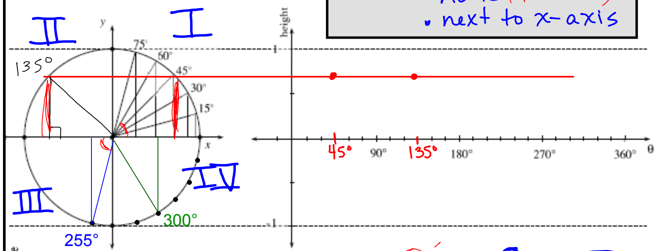
$\sin 135° = \sin 45°$
$= \frac{\sqrt{2}}{2}$
$\approx$

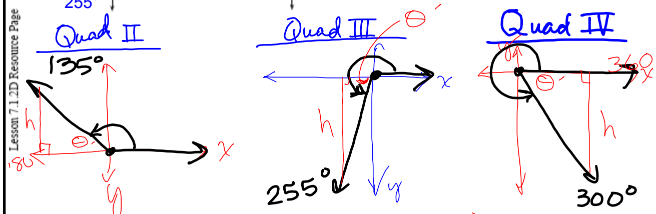
$h = -(\sin 75°)$

CP's: 7-#14

θ' Reference Angles

- Acute (positive)
- next to x-axis





Quad II

$\theta' = 180 - 135$

$\theta' = 45^\circ$

$h = \sin 135^\circ$

$h = \sin 45^\circ$

$h \approx 0.71 \quad h = \frac{\sqrt{2}}{2}$

Quad III

$\theta' = 255 - 180$

$\theta' = 75^\circ$

$h = \sin 255^\circ$

$h = -\sin 75^\circ$

$h \approx -0.97$

Quad IV

$\theta' = 360 - 300$

$\theta' = 60^\circ$

$h = \sin 300^\circ$

$h = -\sin 60^\circ$

$h \approx -0.87$

$h = -\frac{\sqrt{3}}{2}$

HW: 7-

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